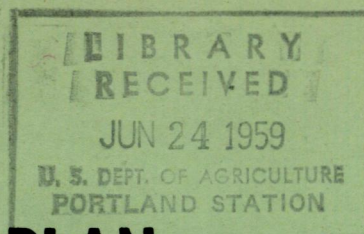


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SAMPLE

SUSTAINED-YIELD PLAN



Illustrating application of minimum requirements for sustained-yield management and specifications for sustained-yield management plans under Act of August 13, 1954 (68 Stat. 718), as amended by the Act of August 23, 1958 (72 Stat. 816).



FOREST SERVICE
U. S. DEPARTMENT OF AGRICULTURE
PORTLAND, OREGON
1959

BIG TIMBER LUMBER COMPANY SUSTAINED-YIELD PLAN ^{1/}
RIVER SUSTAINED-YIELD UNIT

Submitted _____, 19____,

by _____ Title _____

Name of Company Address

I, _____, certify that I am the Secretary of the corporation named herein; that _____ who signed this plan on behalf of the corporation, was then _____ of said corporation by authority of its governing body, and is within the scope of its corporate powers.

CORPORATE
SEAL

Approved _____, 19____,
for period January 1, 1960, through _____
December 31, 1969 Chief, Forest Service, U. S.
Department of Agriculture

1/ Sample plan prepared by Forest Service, U. S. Department of Agriculture, to illustrate application of specifications and minimum requirements for sustained yield jointly developed by the Secretary of the Interior and Secretary of Agriculture under the Act of August 13, 1954 (68 Stat. 718), as amended by the Act of August 23, 1958 (72 Stat. 816). The sample plan does not apply to any particular unit. This sample plan is based on uneven-aged management for ponderosa pine and even-aged management for lodgepole pine. Plans based on even-aged or uneven-aged or both for given types may be equally acceptable.

SUMMARY OF PLAN

A. Summary of resource

	<u>Acres</u>	<u>Volume</u> ^{1/}
Commercial forest land:		
Ponderosa pine type, mature ^{2/}	45,000	297,000 MBF
Ponderosa pine type, immature	500	500 MBF
Lodgepole pine type, mature	1,000	17,000 Cords
Lodgepole pine type, immature	500	500 "
Deforested	1,000	--
Noncommercial forest land	<u>9,000</u>	<u>--</u>
Total	57,000	--

Species distribution (ponderosa pine type)	<u>Percent</u>	<u>Volume MBF</u>
Ponderosa pine	77	229,075
Sugar pine	4	11,900
Douglas-fir	6	17,850
White fir	10	29,750
Incense cedar	1	2,975
Lodgepole pine	<u>2</u>	<u>5,950</u>
Total	100	297,500

B. Summary of 5-year periodic sustained-yield allowable cut (1960 through 1964)

1. Ponderosa pine type (for sawlogs) 28 MMBF
2. Lodgepole pine type (for pulpwood) 75 acres (expected to produce 1,275 cords)

C. Growth, rotation, and cutting cycle

1. Ponderosa pine type -- net growth, 124 board-feet per acre, per year based on: Average site index 80; rotation 140 years; and cutting cycle 20 years.
2. Lodgepole pine type -- growth not calculated because area rather than volume control used (rotation 100 years).

^{1/} Board foot volumes are by Scribner log rule, in trees 11.0 inches d.b.h.; cords are in trees 5.0 inches d.b.h. and over; a standard cord of 128 cubic feet is used.

^{2/} Includes associated species; has been given an initial partial cut.

D. Status of inventory

1. Present -- January 1, 1957 inventory corrected to January 1, 1960.
2. Future -- first reinventory planned not later than 1969 to be current as of January 1, 1970; then each 10 years thereafter or when emergencies arise.

E. Revision of plan

Revisions planned each 10 years, or when emergencies arise. First 10-year revision will be effective January 1, 1970.

F. Silvicultural systems

1. Ponderosa pine type -- partial cutting and uneven-aged management.
2. Lodgepole pine type -- clear cutting and even-aged management (with provision for incidental intermediate cutting for salvage).

G. Reforestation

1. Areas deforested at inception of plan -- future 10-year revision will provide for following national-forest methods and timing in artificial regeneration. In the meantime seed sources will be maintained. No artificial regeneration planned in next 10 years.
2. Lodgepole pine cutting areas -- natural regeneration will be sought; no artificial regeneration scheduled.
3. Ponderosa pine cutting areas -- will reforest artificially if satisfactory natural regeneration not obtained following treatment efforts to take advantage of first ample seed crop.
4. Areas deforested by fire -- areas more than 100 feet from a seed source will be restocked artificially.

- H. Timber stand improvement -- needed thinning and pruning will be done in young ponderosa pine types. No such work contemplated in lodgepole pine.

I. Adjustment periods

1. Ponderosa pine type -- 140 years.
2. Lodgepole pine type -- 100 years.

J. Other Uses

Cattle grazing.

GENERAL STATEMENT AND DEFINITIONS

This plan effective January 1, 1960 is applicable to lands purchased by the Big Timber Lumber Company within the River Sustained-Yield Unit under Section 28 of the Act of August 13, 1954 (68 Stat. 718), as amended by the Act of August 23, 1958 (72 Stat. 816). Hereinafter the Big Timber Lumber Company will be referred to as the Company; and its lands as designated above will be referred to as the Unit.

General location of the Unit is shown on the location map herein, page 1. The Unit is described in detail in the records of the Bureau of Indian Affairs, Portland, Oregon and will be so described in the conveyancing instrument which will include this plan.

This plan sets forth the principles for achieving: (1) Management of the Unit as far as practicable according to sustained-yield procedure so as to furnish a continuous supply of timber; and (2) protection of soil and water resources of the Unit. All revisions and amendments of this plan, made as hereinafter discussed, will provide for a continuation of such principles. It is the Company's understanding that the requirements of this plan with respect to the sustained-yield management of the Unit shall be neither more nor less stringent than the management now and subsequently imposed on comparable national-forest lands.

The Unit will be managed with the long-term objective of producing a sustained yield of timber by 5-year budget periods. Rotation periods will be used for adjustment of growing stock so as to attain the desired distribution of age classes or size classes. It will be

the Company's objective to make uniformly continuous progress toward the adjustment goals.

The Company recognizes that the Secretary of Agriculture is responsible for enforcing the plan. Therefore, the officer of the Forest Service authorized to act in his behalf, hereafter called the Forest Service, will be provided access to the Unit at all times. All maps, aerial photographs and management records of the Company pertaining to management of the Unit will be available for inspection and study by the Forest Service at all times during regular hours of business at the Company's office.

Before commencing operations under this plan, the Company will provide in writing the name of the resident representative authorized to represent the Company and act in its behalf in matters relating to the application of this plan. Thereafter, the Company will notify the Forest Service promptly in writing of changes in personnel.

Commercial forest land of the Unit supporting or capable of supporting the ponderosa pine type will be managed primarily for the production of sawlogs; commercial forest lands suited for the lodgepole pine type will be managed for the production of small round products, mainly pulpwood. Commercial forest land in the Unit consists of the acreage so classified in the appraisal made in accordance with the Klamath Termination Act. Whenever new inventories of the Unit are made, commercial forest land shall be defined and classified under applicable definitions then in use or approved for use in eastern Oregon by the Forest Service.

The Scribner log rule will be used for measuring sawtimber; standard cords of 128 cubic feet will be used to measure pulpwood. The board foot and cord volumes expressed herein are in these terms.

SILVICULTURE AND LOGGING METHODSA. Silviculture1. Silvicultural System for Ponderosa Pine Type

Uneven-aged management will be used. All cutting will be done by the tree selection system with the objective of developing an intimate mixture of age classes and size classes. The emphasis will be on maintaining and developing stands which are predominately ponderosa pine, although it is anticipated that the stands will contain a mixture of the species now associated with ponderosa pine, namely sugar pine, western white pine, lodgepole pine, white fir, Douglas-fir and incense cedar.

Only rarely will more than two or three trees adjacent to each other be marked for cutting, thus restricting the size of openings in the stand. Under this system of management, reproduction will be continuous and a balanced distribution of age classes will be developed on small areas.

The chief product to be removed is sawlogs. All trees to be cut will be marked in advance of cutting in accordance with the marking guides. Opportunity to improve growth rates and balance the distribution of growing stock through release of sawtimber-size trees, poles, saplings and seedlings will be considered in each cutting.

2. Silvicultural System for Lodgepole Pine Type

Even-aged silviculture will be used for lodgepole pine. Under present conditions of the timber stands in this type and the present market outlook for lodgepole pine, the Company plans only one commercial cut during the rotation. This will be the harvest cut and will be accomplished on a clear-cutting basis. Clear cutting will be accomplished by strips or blocks, leaving adjacent areas uncut until the cut-over areas are reforested and the trees have attained seed-bearing age.

Should the formal scheduling of intermediate cuttings become practicable, such schedules will be set forth in future revisions of the plan which will also include methods of charging the cut to the cutting budget. In the meantime, the Company may make intermediate cuts by cutting individual trees whose death is imminent during the season when it is practicable to cut them. Such salvage will be charged to the allowable cut in the manner described herein.

3. Marking Guide for Ponderosa Pine Type

The marking guide is devised with the following factors in mind. Data from the inventory show that present growing stock is unbalanced (Appendix, A-5). There are too few trees in the diameter range 10 inches through 17 inches and too many trees larger than 21 inches.

Another characteristic of the present growing stock is that only a minor percentage of the trees are in Keen's Class 4D (Appendix, A-2). This is an indication of relatively good thrift.

Stand composition as to species is a factor, but not a consequential one (Appendix, A-2). However, there is a tendency for lodgepole pine and other species to invade and take over ponderosa pine sites. The marking guide takes this into account.

On the basis of management objectives and the factors above, the marking guide will be applied so as to--

- a. Concentrate on the removal of high-risk trees in the larger diameter classes in order to make definite progress toward desired stand structure and to maintain good thrift.
- b. Increase the percentage of ponderosa pine and discourage invasion by lodgepole pine and other species.
- c. Remove not more than an average of 2,400 board-feet per acre except where there is a surplus of growing stock or where heavier cutting is necessary to prevent deterioration.

Marking Guide

The following trees will be marked for cutting--

- a. All merchantable dead trees.
- b. All high-risk trees (trees with risk penalties of 9 or more). See "Penalty System for Rating Risk", Appendix, A-1.
- c. All merchantable lodgepole pine.

Insofar as marking under (a), (b) and (c) above does not yield desired volume, additional trees in the following classes will be marked--

- d. Other undesirable trees--
 - 1. Trees with bare spike, 1/3 or more of total height, leaving only a few widely scattered green branches.
 - 2. Trees with heavy lean -- 30 degrees or more.
- e. Mature overstory trees, whose removal will release established understory. Trees will be considered for release in the following order--
 - 1. Immature sawlog-size trees (11" d.b.h. and larger).
 - 2. Large poles (6" to 10" d.b.h.).
 - 3. Small poles (3" to 5" d.b.h.).
 - 4. Reproduction (0" to 3" d.b.h.).

- f. Less desirable species and poorer ponderosa pine in dense patches in order to improve spacing in the reserve stand. Select best quality trees with Keen class "C" or better crowns for leave trees.

4. Designating Lodgepole Pine Type for Cutting

Boundaries of strips or blocks to be clear cut will be marked on the ground in advance of cutting. Insofar as practicable, adjacent uncut areas will be at least as large as cut areas and no part of the cut-over will be more than about 200 feet from an adequate seed source.

Trees selected for intermediate cuts as provided herein will be individually marked. Merchantable dead trees will not be marked but will be considered available for cutting if practicable to do so.

5. Reforestation

Areas of inadequate stocking are divided into two categories: (1) Areas where inadequate stocking exists at the inception of this plan; and (2) areas where stocking becomes inadequate during the period of the plan through cutting, fire, or other cause. In both cases natural regeneration will be encouraged but if it fails the areas will be reforested by artificial

means. Under this broad policy specific action will be as follows:

- a. Existing deforested areas -- in scattered parcels, there are 1,000 acres of deforested land capable of producing timber. Future periodic 10-year revisions of the plan will contain provisions for artificially restocking the portions of this acreage which remain unsatisfactorily stocked, using methods and timing employed on the national forests. Seed sources available to such areas will be maintained until the areas are stocked. No artificial regeneration is planned in these areas in the next 10 years.
- b. Lodgepole pine type to be cutover -- it is anticipated that as much as 150 acres of lodgepole pine type will be clear-cut in the next 10 years. It is believed that the method of silviculture outlined herein, together with the prescribed methods of slash disposal will bring about prompt and adequate natural restocking. No artificial regeneration is scheduled in these cutovers in the next 10 years.
- c. Ponderosa pine type to be cutover -- an estimated 23,600 acres of ponderosa pine type may be cut-over in the next 10 years. Such cutting will be by individual tree selection which will promote

continuous natural reproduction. However, it is anticipated that problem areas will develop. In addition, it is anticipated that a number of small clearcut areas one-half acre and larger will be created. In the aggregate, such openings may total 200 acres in 10 years. Action planned to meet these situations follows.

A continuous delineation of problem areas and clearcut areas will be maintained on maps in the Company office. Coincident with the next expected ample seed crop, aggressive steps will be taken to give each such area existing at the time an optimum chance to be restocked naturally. The steps will include the following, depending upon practicability and need (steps to be taken in advance of seed fall)--

1. Logging operations will be shifted to problem areas so as to scarify the seed bed.
2. Machine scarification of the seed bed will be undertaken where it is not accomplished by logging operations.
3. Rodent populations will be reduced by poisoning.

If reproduction is not established as a result of the seed crop the areas will be seeded or planted over the 5 years succeeding the seed fall. The planting and seeding schedule will be interrupted and revised as necessary in the event ample seed crops reoccur in the 5-year period and it is feasible to prepare the seed bed for natural regeneration.

- d. Areas deforested by fire -- portions of areas burned over which are more than 100 feet from seed sources will be promptly planted or seeded to trees and the work will be repeated within a 5-year period if survival is inadequate. The unplanted portions near seed sources will be provided the same treatment as in item (c) above.

When necessary to determine the adequacy of stocking, the point sampling system employed in the Timber Resources Review Project ^{1/} will be used. Under this system the Company will determine for each observation point whether or not the growing space represented by that point is stocked with a tree meeting crop tree

^{1/} Timber Resources for America's Future, Forest Resource Report No. 14, Forest Service, U. S. Department of Agriculture, page 670.

specifications. No credit will be given for prospective stocking. Stocking will be considered inadequate if less than 40 percent of the observation points are stocked.

6. Timber Stand Improvement

Timber stand improvement work deemed essential to the sustained-yield management of the Unit and not included in the cutting budget consists of thinning, pruning, and weeding.

No timber stand improvement work is contemplated in the next 10 years in the lodgepole pine type except the occasional killing of unmerchantable trees which are badly infested with mistletoe located on the margins of clearcut units.

In the ponderosa pine type there are about 450 acres of immature ponderosa pine in need of thinning. Also many of the crop trees in pole stands need pruning in order to assure production of merchantable sawlogs.

In the next 10 years the work on 215 acres of these stands is scheduled as follows:

THINNING AND PRUNING SCHEDULE

<u>Area No.</u>	<u>1/</u>	<u>Acres</u>	<u>Planned Treatment</u>	<u>Age Class at Treatment</u>	<u>Date of Work</u>
1		40	Thinning - 10' x 10'	35	1960-64
2		85	Thinning and pruning. Thin to 12' x 12' average spacing. Prune about 35 crop trees per acre to height of 18'.	35 and 55 in mixed groups	1962-68
3		50	Thinning and pruning. Thin to 12' x 12" average spacing. Prune about 35 trees per acre to height of 18'.	55	1965-69
4		<u>40</u>	Thinning. Thin to 20' x 20' average species.	85	1960-69 ^{2/}
Total		215			

B. Logging Methods

Any type of logging equipment will be used which will result in economic logging and tolerable logging damage. Emphasis will be placed upon holding to a minimum damage to soil and water and to the reserve stand, including seedlings, saplings, poles and sawtimber trees. Precautions will include the following--

1. Roads, skidroads, and landings will be kept to a carefully planned minimum and will be constructed in advance of felling.

1/ Shown on stand improvement maps in Company office.

2/ This will be undertaken if thinnings can be marketed.

2. Clearing for roads, skidroads and landings will be held to minimum areas practicable under an efficient operation.
3. To the extent practicable, all trees will be felled so as to avoid standing trees and clumps of reproduction.
4. Trees will be felled in proper relation to skidroads and, wherever practicable, logs will be skidded endwise in order to avoid unnecessary disturbance to the soil and damage to reproduction.
5. Temporary roads and skidroads will be protected from avoidable erosion promptly after use has terminated. Crossditching and other effective measures will be used.

FOREST PROTECTIONA. Water and Soil

To accomplish the objectives of soil and water resource conservation the practices stated below will be followed--

1. Yarding will be done across live streams only on permanent or temporary bridges or culverts.
2. Logging debris deposited in live streams will be removed during the logging season in which the work is done before runoff periods.
3. Tractor roads will not be constructed, nor yarding done, across wet meadows or marsh areas.
4. Logging and hauling will not be done or attempted during spring breakup periods.
5. Tractor roads will be treated to prevent erosion. When necessary, erosion barriers will be installed and seeding to grass will be done in the first fall following logging.
6. Nonpublic truck roads maintained for operations in the Unit will be bladed and drained during the summer or fall. Ditch lines, catch basins, and culverts will be cleaned as necessary to insure satisfactory conditions for the soil and water resources.
7. During construction or reconstruction of logging roads the following precautions will be observed--
 - a. Refrain from pushing dirt or debris into draws or live streams.

- b. Place culverts so that ditch line water will be spilled at points away from live or intermittent streams, i.e., spread rather than concentrate ditch water.
- c. Locate roads away from streams, marshes, and meadows whenever the topography will permit.
- d. For all new construction use grade and drainage standards comparable in similar construction of national-forest timber access roads.

B. Fire

1. General

Requirements for fire protection as set forth in the Oregon State Law will be followed. The Unit is located within the Klamath Falls Fire Protection Association district. Annually before April 15, the Company will prepare a fire plan and distribute copies to Company overhead personnel, to the Forest Service and to other cooperators. The fire plan will set forth such things as: Company fire emergency organization and manner of reaching personnel; location and amount of Company controlled manpower, tools, and equipment; communication facilities; and fire suppression arrangements with cooperators.

2. Slash and snag disposal

Slash and snags will be disposed of as follows--

a. Clearing for road rights-of-way and landings

All slash will be piled or bunched and burned on the landing or the roadway or in natural openings at the edge of the right-of-way.

b. Partial cut and thinned areas

When justified by the hazard created, slash will be piled or bunched and burned in strips at least 100 feet wide along truck roads.

c. Clearcut areas

Slash will be disposed of to reduce the hazard adequately and prepare the site for regeneration. Where the slash is to be broadcast burned, a tractor fire-line will be built around the clearcut area.

d. Snag disposal

In all cutting areas and in strips 200 feet wide outside such areas snags over 15 feet high and 12 inches d.b.h. will be felled concurrently with the cutting operation.

3. Extra protection

a. Supplemental detection will be provided by auto patrol on days of high hazard (Class 4 or higher) or immediately following a lightning storm. Patrolmen will be in radio contact with Company headquarters office.

- b. When crew is not in woods during fire season, arrangements will be made for assembling and dispatching an adequate fire crew.

C. Animals, Insects and Diseases

The Company recognizes that there are a number of endemic insect pests in the ponderosa and lodgepole pine types of eastern Oregon which may become epidemic at anytime as a consequence of general climatic and other factors, including the Company's cutting activities. The Company will maintain constant vigilance to detect and act upon possible epidemic outbreaks and to seek advice from the Forest Service and State Forester when needed. In the event that direct insect control measures become necessary, public financial assistance will be solicited from the State Forester.

In the ponderosa pine type the western pine beetle, and usually associated with it, the California flatheaded borer, constitute a serious threat. The comparatively short cutting cycle of twenty years, combined with the emphasis on removal of high-risk trees during all cutting operations should operate to keep these pests under control, particularly during endemic periods. Constant vigilance will be maintained, however, to detect and follow established control practices on possible epidemic outbreaks of these or other insect pests.

Ips beetles also may prove troublesome in the ponderosa pine type. Care will be used in slash disposal on cutting operations and in connection with road construction to prevent damage, particularly to young stands, which might tend to stimulate increased Ips activity.

The serious insect pests affecting the lodgepole pine type are the mountain pine beetle, lodgepole needle miner, and the lodgepole pine sawfly. Since no intermediate cuttings of consequence are planned for this type there is little opportunity to control these insects by regular silvicultural practices. When practicable to do so, cutting operations will be shifted to areas where epidemic infestations occur.

Dwarfmistletoe is a serious pest, particularly in ponderosa pine and in lodgepole pine. In the ponderosa pine type it may be necessary to alter the basic silvicultural system in heavy infection areas to reduce dwarfmistletoe infection. In the lodgepole pine type, clear cutting may be used effectively to stimulate control measures. One of the criteria the Company will use for selecting patches or strips for clear cutting will be the incidence of mistletoe. Heavily mistletoed reproduction and unmerchantable trees on clearcut areas will be destroyed prior to regeneration of the areas.

The needlecast disease of ponderosa pine may become troublesome. Should needlecast reach epidemic proportions control measures may dictate departure from the basic silvicultural method prescribed for the ponderosa pine type.

Western white pine and sugar pine are present on the Unit but are of minor importance. For this reason no measures will be undertaken for the control of white pine blister rust.

Porcupines are a constant cause of mortality in lodgepole and ponderosa pine types. Control will be sought constantly by the following means--

- a. On-sight killing by employees.
- b. Use of poisonous salt blocks.

CALCULATION OF SUSTAINED-YIELD ALLOWABLE CUT

Sustained-yield allowable cut by major forest types is calculated for the period 1960 through 1969 on the basis of available resource data summarized as follows:

<u>Class</u>	<u>Acres</u>	<u>Volume per Acre MBF</u>	<u>Total Volume MBF</u>
<u>Commercial Forest Land</u>			
Ponderosa pine type-- Mature <u>1/</u>	45,000	6.6	297,000
Ponderosa pine type-- Immature <u>1/</u>	<u>500</u>	<u>1.0-</u>	<u>500</u>
Total	45,500	6.5 (av.)	297,500
		<u>Cords</u>	<u>Cords</u>
Mature lodgepole pine	1,000	17.0	17,000
Immature lodgepole pine	<u>500</u>	<u>1.0</u>	<u>500</u>
Total	1,500	11.6 (av.)	17,500

A. Ponderosa pine type

Site index for this type is 80. Rotation is fixed at 140 years based upon culmination of mean annual increment in board-feet for site index 80. ^{2/} A cutting cycle of 20 years if chosen. A shorter cutting cycle would be desirable but is considered impracticable because of reduced average cut

1/ Includes associated species such as ponderosa pine, sugar pine, Douglas-fir, white fir, incense cedar, and lodgepole pine.

2/ Technical Bulletin 630, U. S. Department of Agriculture, Meyer, Walter H., 1938

per acre. A period longer than 20 years between recurrent cuts on the same area would reduce net growth.

The Austrian formula is used to compute sustained-yield allowable cut. This formula is as follows--

$$\text{Allowable Cut (AC)} = \frac{V_t - V_d}{n} + AG$$

In the above formula, the symbols are defined as follows--

AC -- Allowable annual cut that can be sustained while bringing the forest into its potential level of continuous productivity or while maintaining it at that level.

V_t -- Present volume in trees 11.0 inches, d.b.h. and larger, as determined by the inventory. For the Unit it is now 6,500 board-feet per acre.

V_d -- Desired volume, in trees 11.0 inches, d.b.h. and larger, which is part of a managed forest whose growing stock is balanced by having all age classes up to rotation age properly represented. For the Unit this is established at 6,800 board-feet per acre (Appendix, A-3).

n -- The adjustment period in years during which an approximately balanced growing stock and high potential growth rate can be attained. The full rotation is used for the adjustment period.

AG -- The average annual net growth and ingrowth for ponderosa pine and associated species during the next cutting cycle. For the first 20-year cutting cycle it is determined for the Unit by the following steps (Appendix, A-4)--

- a. Using periodic annual board-feet taken from growth curve (157 board-feet).
- b. Correlating curved growth with actual values using a factor of 0.94 ^{1/} (157 x 0.94 = 148).
- c. Deducting 24 board-feet per acre for mortality (148 - 24 = 124).

Next, to compute sustained-yield allowable cut, substitutions are made in the Austrian formula:

$$\begin{aligned}\text{Allowable cut} &= \frac{6500 - 6800}{140} + 124 \\ &= 122 \text{ board-feet per acre per year}\end{aligned}$$

Since there are 45,500 acres of stocked, commercial forest land, the 5-year periodic allowable cut is:

$$\begin{aligned}\text{5-year periodic allowable cut} &= (5) \times (45,500) \times (122) \\ &= 28 \text{ million board-feet}\end{aligned}$$

^{1/} The factor of 0.94 as used here is an average value for the Klamath Reservation. If such a factor is used in computing growth for a particular unit, a factor applicable to the particular unit would need to be used.

B. Lodgepole pine type

Practical experience indicates that somewhere between 100 and 140 years lodgepole pine stands have a tendency to lose vigor and become subject to epidemic attack by the mountain pine beetle. For these reasons, a rotation of 100 years has been adopted for this type.

Clear cutting in strips or patches will be practiced in this type.

Allowable cut is determined by area control. This consists of dividing acreage by rotation and multiplying the result by the average volume per acre expected from mature stands.

For this Unit the calculation is as follows:

Area of lodgepole pine type -- 1,500 acres

Rotation -- 100 years

Average volume per acre mature lodgepole type -- 17.0 cords

$$\text{Allowable cut} = \frac{1500}{100} = 15 \text{ acres per year, or} \\ 75 \text{ acres per 5 years}$$

75 acres x 17 cords = 1,275 cords, the expected 5-year yield

C. Area revisions for future calculations

The 1,000 acres of deforested commercial forest land have been excluded in the calculation of allowable cut. When allowable cut is recalculated incident to revisions of this plan the then current situation will govern. All stocked areas will be included in the calculations.

SUSTAINED-YIELD CUTTING BUDGET AND CONTROL RECORD

The sustained-yield allowable cut will be budgeted by 5-year periods. The entire cut budgeted for a 5-year period may be harvested in any one or more years during the 5-year period, depending upon economic conditions and the needs of the Company.

In the ponderosa pine type, cutting will be controlled by volume. Control of cutting in the lodgepole pine type will be on the basis of area.

Insofar as practicable, cutting operations shall be conducted substantially in accordance with the cutting budget. Authorized overcutting exceptions and the method of compensating for undercutting follow (applicable for both ponderosa pine type and lodgepole pine type)--

- a. Overcutting in any 5-year budget period shall not exceed the allowable cut by more than 5 percent.

Making up undercutting as provided for in (b) below will not be considered as overcutting.

- b. Undercutting may be made up, but not more than two years' annual allowable cut may be carried forward and harvested as an undercut in the last 5-year budget period of a decade.

- c. Undercutting may not be carried over when the plan is revised.

The above rules are subject to revision when the plan is revised in 1970, and thereafter.

A. Cutting Budget (January 1, 1960 through December 31, 1964)

Cutting Map.No.	1/	Location T R Sec.	Type of Cutting	Acres to be cutover	Product & Vol. to be Removed
					<u>Ponderosa Pine Type</u>
					<u>MBF, Sawlogs</u>
1	:36	10 23	: Tree Selection	: 2,000	: 5,000
2	:36	13 29, 30	: Tree Selection	: 5,800	: 15,000
3	:34	11 22, 23	: Tree Selection	: 4,000	: 8,000
		26, 27	:	:	:
5-year total	--		: Tree Selection	: 11,800	: 28,000
					<u>Lodgepole Pine Type</u>
					<u>Cords, Pulpwood</u>
4	:35	11 35	: Clear cut	: 75	: 1,275

This budget is prepared in accordance with the following

5-year periodic allowable cut--

1. Ponderosa pine type. 28 million board-feet from about 11,800 acres, an average cut of about 2,400 board-feet per acre.
2. Lodgepole pine type. 75 acres, expected to yield 1,275 cords, an average of about 17 cords per acre.

B. Control Record

A cutting map and a control record will be maintained showing all cutting done under this plan. The map record will show the

1/ The cutting map is not included in this plan but is maintained in atlas records at the Company office.

areas cutover each year and the tabular record will show the volume removed by species and products.

Any intermediate cutting to salvage dying lodgepole pine as described herein will be converted to area at an average rate of 17 cords per acre. The resulting area will be charged to the allowable cut for lodgepole pine. No attempt will be made to show such cutting on the cutting map, however.

It is anticipated that during the adjustment period economic conditions will change warranting continuously higher levels of woods and plant utilization so that more suppression mortality and other losses can be captured through intermediate cuttings. Any such advances in utilization will be reflected in recomputing sustained-yield allowable cut at 10-year intervals. There is no way of accurately predicting such potential sustained yield. Based on present practices, all live and dead merchantable timber cut under this plan will be charged to the sustained-yield allowable cut, except that obtained from trees or material not considered in calculating allowable cut, such as--

1. Trees from non-commercial forest land.
2. Material salvaged from logging waste.
3. Trees in ponderosa pine type less than 11.0 inches d.b.h. and those in lodgepole pine type

less than 5.0 inches d.b.h. (insofar as it is feasible to account for them, i.e. incidental volume in trees damaged by logging, rights-of-way clearing, etc.

The form of control record which the Company plans to use is as follows (A separate record will be kept respectively for ponderosa pine type and lodgepole pine type):

CONTROL RECORD - PONDEROSA PINE TYPE 1/

Calendar Year	Cutting Map No.	Acres Cut Over :		Volume Cut					
		Current	Total to:	Current Year		Total to Date			
		Year	Date	Species	Products	Volume	Species	Products	Volume
1960									
1961									
1962									
1963									
1964									
5-year totals									
1965									
1966									
1967									
etc.									

The control record will be maintained in the Company office.
To help safeguard the data from loss, a certified copy of each
year's entries will be sent to the Forest Service annually.

1/ A similar record will be prepared for other types.

REVISION OF INVENTORY AND MANAGEMENT PLAN

This plan is based on the inventory conducted at the direction of the Management Specialists under the Klamath Termination Act. That inventory was current as of January 1, 1957, but has been corrected to January 1, 1960 by adding growth to the sawtimber volume. The growth added was 17.0 million board-feet (obtained by: 3 years x 124 board-feet x 46,500 acres). During the three-year period there was no logging, fire, or other event of significance on the Unit. In addition, 1,000 acres of land in scattered tracts were classified as "deforested commercial forest land" as a result of examining areas which in the 1957 inventory were grouped with "noncommercial forest land" because they were unstocked. No inventory adjustments were made in the lodgepole pine types.

The Company will reinventory the resources of the Unit and revise the plan each 10 years to embrace the new inventory data, changed economic conditions, and advances in forestry being applied on the national forests. Under this program, the first reinventory will be started not later than in 1969 and conducted in time to be current as of January 1, 1970. Following that the plan will be revised to become effective January 1, 1970.

The Company will conduct reinventories and prepare emergency revisions to this plan at any time for the balance of the decade when made necessary by radical shifts in the basic economy or to meet catastrophic events resulting from fire, insects, or any other

cause. Emergency revisions will be undertaken upon a determination by the Chief of the Forest Service that they are necessary or upon approval by him of the Company's application.

The Company will use methods and standards of inventory approved by the Forest Service and will submit all revised plans to the Forest Service for approval. Revised plans will include such provisions as the Chief of the Forest Service determines to be necessary if the Company's revision is not approved and the Company fails to make needed changes after deficiencies have been made known to the Company and it has been given an opportunity to state its views.

AMENDMENTS TO THE PLAN

It is intended that portions of this plan may be amended at any time, except that recalculation of allowable cut will be done only at 10-year intervals or as an emergency action as provided herein. When amendment of any section of this plan is deemed necessary, the Company intends to discuss the matter informally with the Forest Service. If the Forest Service concurs, the amendment will be prepared and will be submitted formally to the Forest Service, for approval. The amendment will be effective only upon approval. Each approved amendment will be recorded in the Court House, Klamath County, Oregon, by the Company.

OTHER LAND USES

There are 9,000 acres of noncommercial forest land in the Unit. Some of this land is economically useful for stock grazing if utilized in conjunction with forage found on the commercial forest land. Accordingly, it is the Company's plan to lease grazing rights for cattle. The grazing will be controlled by the Company and modified or eliminated if necessary to prevent undue interference with sustained-yield forest management or damage to soil and water resources of the Unit.

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A-1 PENALTY SYSTEM FOR RATING RISK IN PONDEROSA PINE

The risk rating of individual trees can be determined by application of the following penalty system. A high-risk tree will have a penalty score of 9 or more.

A. <u>Needle Condition</u>	<u>Penalties</u>
(1) <u>Needle Complement</u> (Number of needle fascicles per twig)	
Less than normal complement throughout crown. No contrast evident in complement between upper and lower crown.	2
Thin complement in upper crown; normal complement in lower crown. Contrast in complement evident between upper crown and lower crown.	4
(2) <u>Needle Length</u> (Length of individual needle)	
Needles shorter than normal throughout crown. No contrast evident in needle length between upper crown and lower crown.	2
Needles short in top; normal length below. Contrast in needle length evident between upper crown and lower crown.	4
(3) <u>Needle Texture</u> (Apparent weight of needle - coarse or fine)	
Light needles throughout crown. No contrast in texture evident between needles in top crown and lower crown.	1
Feathery needles in top crown; normal or light texture in lower crown. Contrast in texture evident between top and lower crown.	2
(4) <u>Needle Color</u> (Green color of needles)	
Needle color light green - lighter than normal green.	1
Needles definitely off color.	2

PenaltiesB. Twig and Branch Conditions

- | | |
|---|---|
| (1) A few <u>scattered</u> dead or dying twigs or branches in crown. | 0 |
| (2) Many <u>scattered</u> dead or dying twigs or branches in crown. | 1 |
| (3) Severe <u>scattered</u> dead or dying twigs or branches in crown. | 2 |
| (4) Severe dead or dying twigs or branches in crown which form a definite weak spot or hole in crown, particularly in top 1/3 of crown (<u>localized weakness</u>). | 3 |
| (5) Severe dead or dying twigs or branches in crown which form more than one weak spot in crown, particularly in top 1/3 of crown (<u>localized weakness</u>). | 5 |

C. Top Crown Condition

- | | |
|---|---|
| (1) Old top kill where there is no progressive weakness or killing in green crown below. | 2 |
| (2) Old top kill and a progressive weakness or killing in green crown below. | 4 |
| (3) Old spike where there is no progressive weakness or killing in green crown below. | 1 |
| (4) Old spike and a progressive weakness and current killing of limbs and branches below. | 5 |
| (5) Long bare spike (1/3 or more of total stem length) which leaves only a few widely spaced green branches in crown. | 6 |

D. Other Factors

- | | |
|--|---|
| (1) Keen Tree Classes. All C and D crowns. | 2 |
| (2) Lightning strikes - Currently struck | 9 |
| Old strike (healed) | 1 |
| (3) <u>Dendroctonus valens</u> attacks in basal bole - Current | 6 |
| Old pitched out | 2 |

A-2 SUMMARY OF STAND STRUCTURE AND SPECIES COMPOSITION

Species and Keen Classes for <u>Ponderosa Pine</u>	Average No. Trees Per Acre
1A	2.66
1B	1.66
1C	0.61
1D	0.06
Total 1's	4.99
2A	1.78
2B	2.24
2C	1.26
2D	0.20
Total 2's	5.48
3A	1.26
3B	1.52
3C	1.06
3D	0.24
Total 3's	4.08
4A	0.12
4B	0.09
4C	0.04
4D	0.02
Total 4's	0.27
Ponderosa Pine	14.82
Sugar Pine	0.35
Douglas Fir	0.25
White Fir	2.09
Lodgepole Pine	2.94
Incense Cedar	0.12
TOTAL ALL SPECIES	20.57

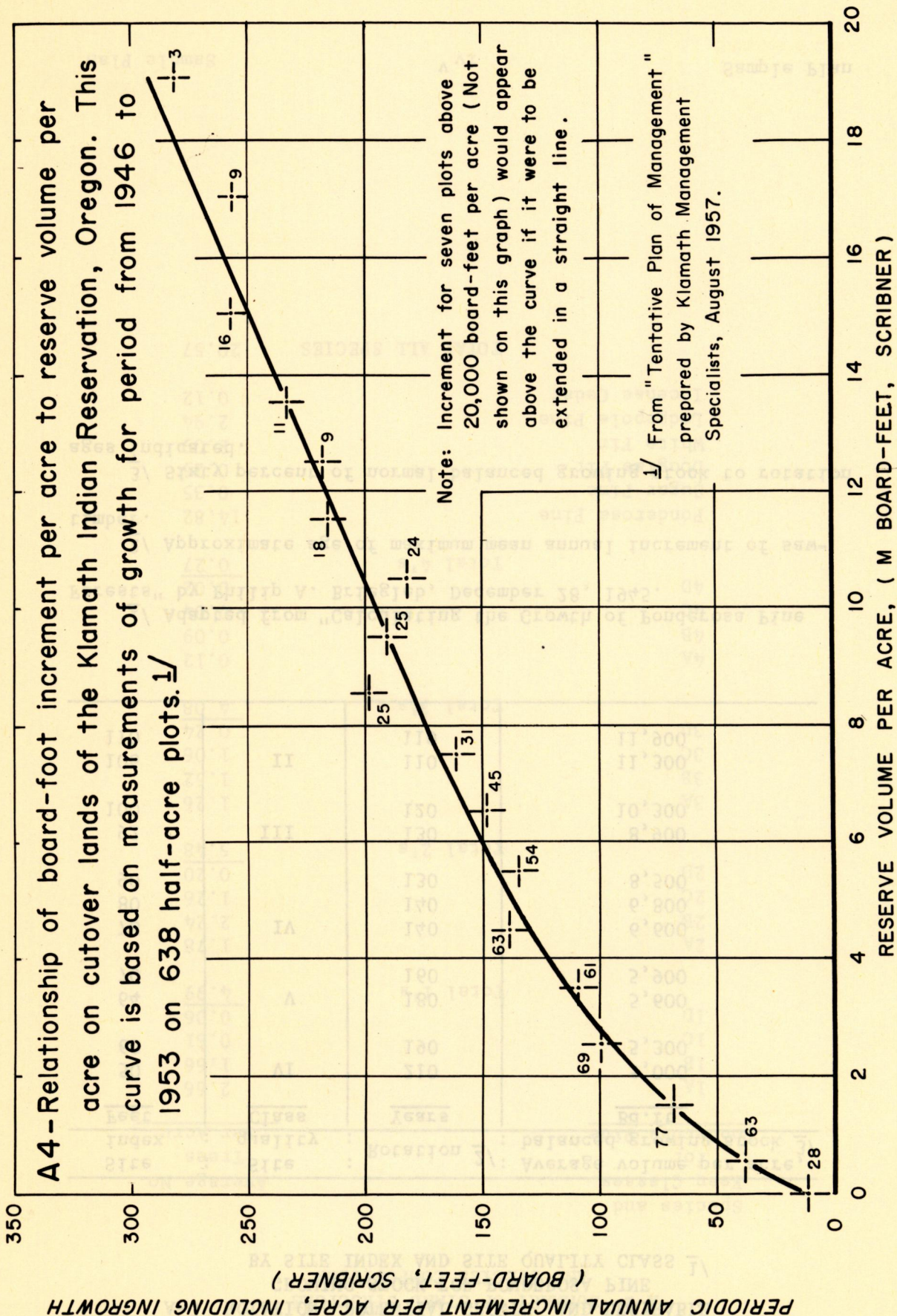
A-3 ROTATION, POTENTIAL GROWTH, AND DESIRABLE
GROWING STOCK FOR PONDEROSA PINE
BY SITE INDEX AND SITE QUALITY CLASS 1/

Site index	Site quality	Rotation <u>2/</u>	Average volume per acre, balanced growing stock <u>3/</u>
Feet	Class	Years	Bd.ft.
50	VI	210	5,000
60		190	5,300
64	V	180	5,600
70		160	5,900
78	IV	140	6,600
80		140	6,800
90		130	8,500
92	III	130	8,900
100		120	10,300
106	II	110	11,300
110		110	11,900

1/ Adapted from "Calculating the Growth of Ponderosa Pine Forests" by Philip A. Briegleb, December 28, 1945.

2/ Approximate age of maximum mean annual increment of saw-timber.

3/ Sixty percent of normal balanced growing stock to rotation ages indicated.



A-5 PRESENT GROWING STOCK
PONDEROSA PINE TYPE

<u>DBH Class</u> <u>Inches</u>	<u>No. of Trees Per Acre</u> <u>In Present</u> <u>Growing Stock ^{1/}</u>
1	Data
2-3	Not
4-5	Available
6-7	
8-9	
Subtotal 1-9	—
10-11	4
12-13	3
14-15	3
16-17	2
Subtotal 10-17	12
18-19	2
20-21	2
Subtotal 18-21	4
22-60	5
TOTAL	21

^{1/} Derived from Table I of Volume II, "Tentative Plan of Management and Recommended Form of Legal Entity for the Klamath Indian People", prepared by the Klamath Management Specialists, Revised August 1957. Ponderosa pine and associated species.